



Falcon Technology Demonstration Program Fact Sheet

Program Goal

The goal of the joint Defense Advanced Research Projects Agency (DARPA)/Air Force Falcon program is to develop and validate, in-flight, hypersonic technologies that will enable prompt global reach missions and demonstrate affordable and responsive space lift. The fundamental underpinning of the technical approach being taken in the Falcon program is the recognition that a common set of technologies can be matured in an evolutionary manner enabling development of a reusable hypersonic cruise vehicle for the far-term. This common set of key technologies includes: efficient aerodynamic shaping for high lift to drag, lightweight and durable high temperature materials, thermal management techniques including active cooling and trajectory shaping, target update and autonomous flight control. The Falcon program will incrementally demonstrate these required technologies in flight using a series of hypersonic technology vehicles or hypersonic technology test beds. The Falcon program will also develop a low-cost, responsive small launch vehicle with a twofold objective: to place small satellites into low earth orbit and to provide a low-cost means of launching sub-orbital hypersonic technology vehicles.

Program Vision

The Government's vision of an ultimate prompt global reach capability (circa 2025 and beyond) is engendered in a reusable hypersonic cruise vehicle. This autonomous aircraft would be capable of taking off from a conventional military runway, carrying a 12,000-pound payload, and reaching distances of 9,000 nautical miles in less than two hours. This hypersonic cruise vehicle will provide the country with a significant capability to conduct responsive missions with quick turn-around sortie rates while providing aircraft-like operability and mission-recall capability.

The Small Launch Vehicle (SLV) will provide the nation with a new, small payload access to space capability while enabling affordable implementation of the Falcon hypersonic technology flight-test program. The SLV will be capable of boosting hypersonic technology vehicles to conditions required for validating the performance of hypersonic technologies in flight. The primary objective is to develop a capability to place a small satellite weighing approximately 1,000 pounds into a reference orbit defined as circular, 100 nautical mile altitude, due east, and launched from 28.5° north latitude for a total launch cost of less than \$5 million (excluding payload and payload integration costs). These objectives are a significant spiral in the development of an Operationally Responsive Spacelift capability currently being pursued by the Air Force. NASA has also expressed interest in the Small Launch Vehicle capability and is a formal partner in the Falcon Small Launch Vehicle development program.

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Program Approach

The Falcon program is divided into three phases:

- Phase I (System Definition). Six months long. Organized into two tasks.
 - The first task focused on the Small Launch Vehicle (SLV). Nine contractors developed conceptual designs, performance predictions, cost objectives, and development and demonstration plans for a SLV. Contractors were: Airlaunch, Andrews Space, Exquadrum, KT Engineering, Lockheed Martin, Microcosm, Orbital Sciences, Schafer, and Space Exploration Technologies.
 - In the second task, four contractors developed conceptual designs, concepts of operations, and demonstration plans for critical technologies for the hypersonic technology vehicle portion of the program. Contractors were: Andrews Space, Lockheed Martin, Northrop Grumman, and Boeing.
- Phase II (Design and Development). 36 months long.
 - Airlaunch LLC; Lockheed Martin Corp., Space Systems Co.; Microcosm Inc.; and Space Exploration Technologies Inc. were selected via an open competition to conduct preliminary SLV design and risk reduction demonstrations. The program will down-select to one or more contractors early in this phase. Phase II will conclude with flight demonstrations of the SLV integrated with a payload.
 - Lockheed Martin Aeronautics Co. was selected to develop and flight-test a low-risk, first-generation Hypersonic Technology Vehicle (HTV-1) integrated with state-of-the-art hypersonic technologies, and develop second and third generation Hypersonic Technology Vehicle (HTV-2 and HTV-3) designs with increasingly advanced aerodynamic configurations and thermal protection systems, improved guidance, navigation and control systems, and reusable materials. Lockheed Martin was selected from Phase I performers to execute the Phase II effort.
- Phase III (Technology Demonstrations). 30 months long.
 - The program will conduct a flight demonstration of an integrated HTV-2/SLV system and multiple flight demonstrations of a reusable HTV-3 vehicle. Details of the phase will be defined based on Phase II results.

Program Management

- Dr. Steven Walker from DARPA is the Falcon program manager and Major John Anttonen from the Air Force Space Command/Space and Missiles Systems Center is the deputy program manager.

Additional Resources

- Program web site – <http://www.darpa.mil/tto/programs/falcon.html>.
- News releases announcing Phase I and Phase II contractors, see http://www.darpa.mil/body/NewsItems/pdf/falcon_ph_1.pdf , http://www.darpa.mil/body/NewsItems/pdf/falcon_ph2_t2.pdf .
- Media point of contact: Jan Walker, DARPA, (703) 696-2404, jwalker@darpa.mil.